of Drawing Changes adds "Prior Art" to Figs. 1 and 2 and Applicants respectfully requests reconsideration and withdrawal of the objection to the drawings.

The Office Action rejected claims 1-12 under 35 U.S.C. §103(a) as being unpatentable over *King* (U.S. Patent No. 5,334,941) in view of *Osaki et al.* (U.S. Patent No. 4,710,700), *Heikkila* (U.S. Patent No. 4,500,835) and *Todoroki et al.* (U.S. Patent No. 5,699,163). Applicants respectfully traverse the above rejection of the claims according to the remarks below. Specifically, Applicants assert that elements of the claims are not taught or suggested by the references and that the motivation supplied by the Examiner is insufficient to support the rejection of the claims.

The present invention is directed to instrument for measuring orientation. The instrument includes a resonator (20) generating a resonance mode and antennas (22a and 22b) for the resonator. Dielectric anisotropy of a sample (25) is measured by the variance of the resonance frequency as the sample or resonator is rotated. The instrument is applicable to sheet-like samples and three-dimensional molded samples also.

King is directed to an *in situ* sensor for measuring or monitoring the dielectric and conductive properties of solids, liquids and gases at microwave frequencies. The sensor uses a microwave resonator (11) that is in contact with a sample (9). An electric field is generated and the reflection energy data is processed to determine dielectric anisotropy of the sample under test. *King* also discloses that the orientation of fibers can be determined through measurements of the sensor. The Examiner acknowledges *King* fails to teach a rotation mechanism for rotating the sample or the resonator, and relies on the other cited references to make up for this deficiency.

Regarding the rejection of claim 1, Applicants also respectfully point out that the resonator 20 of the present invention is a dielectric resonator. On the contrary, *King* discloses a microstrip resonator, which is different from a dielectric resonator. Although the Office Action appears to regard the resonator 11 of *King* as a dielectric resonator, *King* does not teach a dielectric resonator.

The dielectric resonator 20 of the present invention has a plane being close to or in contract with a sample, the plane exuding evanescent waves from the inner part of the dielectric resonator, so that it generates an electric field vector having an unidirectional component in an in-sample plane parallel to the plane of the dielectric resonator 20 with high Q value of resonance. Furthermore, the resonator 20 couples with a test material by the plane, resulting in a strong electromagnetic coupling. As a result, the dielectric resonator 20 of the present invention can determine dielectric anisotropy with high sensitivity.

In contrast, *King* discloses microstrip resonators, for example, as described as the phrases “microstrip resonator sensors” on line 20 in column 1 and “microstrip resonators” on line 33 in column 2. A microstrip resonator is different from a dielectric resonator in its operating principals of resonance and functions. The difference between the two types of resonators is discussed in the attached document “MICROWAVE ENGINEERING”, the partial translation of which is also provided.

King discloses a sensor 20 consisting of a highly conducting (e.g. metal) microwave resonator 11, which is provided on the surface of a dielectric substrate 12 (Fig. 2, column 10, lines 35-41). The resonator 11 is a microstrip resonator, which is essentially a linear antenna, but not a dielectric resonator. Although the resonator 11

has the dielectric substrate 12, the dielectric substrate 12 is placed at the opposite side of the test material 9 with respect to the resonator 11, hence the dielectric substrate 12 does not contribute to resonance.

As a result, the antenna resonator 11 has a low Q value of resonance, and it is difficult to find a suitable resonance peak for measuring dielectric constant. Furthermore, since the antenna resonator 11 has a linear shape, an electromagnetic coupling with a test material is weak, and this results in a low sensitivity of measurements. The sensor 20 having the antenna resonator 11 may be able to determine dielectric anisotrophy, however, the sensitivity is low.

Regarding to claims 2 and 3, the Office Action alleges that the operational mode involving a plurality of resonators in Fig. 7 of *King* corresponds to a plurality of dielectric resonators and a plurality of sets including sets of microwave exciters of the present invention. Applicants respectfully traverses this assertion too.

In claim 2, there are provided a plurality of dielectric resonators, which generate electric field vectors having directions different from each other. In claim 3, there are provided a dielectric resonator and a plurality of sets of microwave exciters and detectors, which generate electric field vectors having directions different from each other. The resonators claimed in claims 2 and 3 can determine dielectric anisotropy of the sample while neither the sample nor the dielectric resonators are rotated.

In contrast, the sensor 50 shown in Fig. 7 of *King* has multiple microstrip resonators 11a, 11b and 11c, which have different corresponding lengths La, Lb and Lc so as to resonance at different frequencies (column 11, lines 53-58). These resonators 11a, 11b and 11c generate electric field vectors having the same direction. Therefore,

sensor 50 shown in Fig. 7 *King* cannot determine dielectric anisotropy of the sample by switching excitation of the resonators 11a, 11b and 11c in turn.

As discussed below, Applicants respectfully assert that the other references cited in the above rejection fail to teach or suggest a dielectric resonator as opposed to a microstrip resonator and that the rejection is improper for failing to teach or suggest all of the elements of the claims.

Osaki et al. is directed to a method of measuring orientation or dielectric characteristics of sheets or webs. A sweep oscillator (4) emits a linearly polarized wave that directed by a transmitting antenna (5) such that the emitted microwaves fall on the surface of a sheet (3) at right angles thereto. Transmitted waves are received by a detector (13) and either the sample (Fig. 1) or the upper and lower waveguides (1 and 2) are rotated. The variation of the resonance frequency with angle of rotation is determined to provide the relative orientation of the sheet. Applicants respectfully assert that there is no motivation to combine the references, as discussed below.

Heikkila is directed to method and apparatus for detecting grain direction in lumber. Microwave radiation is either passed through or reflected from a piece of lumber (1) being tested. The radiation is introduced by a transmitting antenna (3) and received by a receiving antenna (2), where the antennas have polarizations that are 90° out of phase. Signals received are compared to determine the grain direction of the lumber. Applicants note that while the Examiner has relied upon this reference to show that the prior art teaches the rotation of the sample or the resonator, neither is taught by *Heikkila*. As such, Applicants respectfully assert that *Heikkila* cannot be relied upon to

teach or suggest rotation of the sample or resonator and, therefore, this portion of the rejection must be improper.

Todoroki et al. is directed to a method of determining the orientation of fibers on the surface of a paper. The method uses a laser beam with a projecting unit (6) and a receiving unit (7), where the receiving unit receives and detects the intensity of the light reflected from a surface (1a) of a paper (1). The sample table (2), upon which the paper rests, is rotated and the intensity is determined as a function of rotation angle to determine the orientation of fibers in the paper. Applicants note that the method disclosed in *Todoroki et al.* is applicable to only flat surfaces, such as paper or cloth. Applicants also note that while the sample table does indeed rotate, it does not do so with respect to the plane of a dielectric resonator. Rather the rotation occurs about a center point (3) through which inclination of the sheet is made.

In addition, Applicants also note that *Todoroki et al.* teaches away from the combination of the references. *Todoroki et al.* discusses the detection of orientation of a sheet using polarized microwaves (column 1, line 59 - column 2, line 6), but indicates that such measurements cannot occur over a relatively short time and do not rely on purely surface measurements (column 2, lines 7-13). A prior art reference "must be considered in its entirety, i.e., as a whole, including portions that would lead away from the invention in suit", *Panduit Corp. v. Dennison Mfg. Co* ., 810 F.2d 1561, 1568 [1 USPQ 1593, 1597] (Fed. Cir. 1987). *Todoroki et al.* teaches away from the combination of the references and for at least this reason, Applicants respectfully assert that the rejection is improper.

Applicants also propose that the motivation provided in the rejection is insufficient to support the rejection. The Examiner alleges that "[t]he suggestion/motivation for doing so would have been that, as already noted, relative rotation between the sample and the microwave source, as well as a transmission mode of testing, are <u>both widely used in the art</u>." Applicants respectfully assert that this does not supply motivation but instead alleges a possibility that the references could be combined. There is no reason provided that suggests any benefit from the combination.

To establish a *prima facie* case of obviousness, there must be some motivation or suggestion, either in the references themselves or within the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. The fact that a given modification would have been "well within the ordinary skill in the art" or generally known in the art is not sufficient to establish a *prima facie* case of obviousness. <u>Ex parte Levengood</u>, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). Just because an aspect of the invention may be "obvious to try" does not provide the proper motivation under §103. As such, Applicants assert that the rejection is improper for failing to supply motivation to combine the references.

In addition, Applicants assert that one of ordinary skill in the art would not have been motivated to combine the references as provided in the rejection because the process discussed in each are very different. Even though the Examiner explicitly states that *King, Osaki et al., Heikkila* and *Todoroki et al.* are "analogous art", that does not provide motivation. *King* discloses a microwave resonator that is placed in contact with a sample but all of the other references are explicitly non-contact methods. In fact, *Osaki et al.* extols the virtues of its methods over prior art dielectric detection methods

because the non-contact method allows a larger number of measurements in a short time (column 2, lines 59-68). As such, Applicants assert that one of ordinary skill in the art would not have been motivated to combine the references because of their inherent differences.

As such, Applicant respectfully asserts that the rejection of claims 1-12 is improper for failing to teach or suggest all of the elements of the claims. Applicant therefore respectfully requests that claims 1-12 be found allowable, and this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 1-2300.

Respectfully submitted,

ARENT FOX KINTNER PLOTKIN KAHN PLLC

Kevin F. Turner
Attorney for Applicants
Reg. No. 43,437

Atty. Docket No. 107331-09002

1050 Connecticut Avenue, N.W., Suite 600
Washington, D.C. 20036-5339
Tel (202) 828-3452
Fax (202) 638-4810

KFT:ejb